

## FEU07 – SOP for Ejection Pattern Testing

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### 1. Scope

- 1.1. This standard operating procedure is designed to provide a basis for defining the approximate position of a shooter in the reconstruction of a shooting scene.

### 2. Background

- 2.1. To establish the practices for documenting the examination of firearm evidence to conform to the requirements of the Department of Forensic Sciences (DFS) Forensic Science Laboratory (FSL) *Quality Assurance Manual*, the accreditation standards under ISO/IEC 17025:2005, and any supplemental standards.

### 3. Safety

- 3.1. For proper handling of firearm see the *FEU01 - SOP for the Safe Handling of Firearms*.

### 4. Materials Required

- 4.1. Evidence Firearm, Measuring Tape; Test ammunition; Eye and ear protection; marking material for floor (tape, chalk, string etc.); pen/pencil; Laboratory coat; tripod; camera

## **5. Standards and Controls**

5.1. Not applicable

## **6. Calibration**

6.1. Not applicable

## **7. Procedures**

7.1. General Procedures

7.1.1. Before conducting this test, ensure that all other requested firearms examinations have been conducted.

7.1.2. The ejection pattern test will be conducted on a firing range that is clear of any previously fired ammunition components.

7.2. Specific Procedure

7.2.1. The surface will be marked in a manner with two intersecting lines. One line is from the shooting line traveling down the center of the shooting lane. The second line will cross this line at a right angle, and these lines may be extended as needed. The suggested "grid" divides the area into four quadrants (front-left, front-right, rear-left, rear-right). The center of the tripod is to be placed on top of the grid where all lines intersect with each other; this will be call position zero. All measurements will be taken from position zero to where the cartridge case first lands. The markers utilized will have numbers and be placed in numerical order every time the spotter is marking the area.

7.2.2. This test requires two FEU members; one member will act as the shooter, and the other member to act as the spotter. The shooter will stand so that the intersecting lines on the floor are below the ejection-port of the firearm. The firearms specialist/shooter will hold the firearm on the top of the tripod; the tripod will aid the firearms specialist to discharge the firearm from the same location and the same height. The use of the tripod will assist the firearms specialist to level the firearm every time the firearm is discharged.

7.2.3. The shooter will discharge the suspect firearm a minimum of ten (10) times.

- 7.2.4. It is the spotter's responsibility to mark where each ejected cartridge case first strikes the ground surface. This may be done with any marking device. The spotter will also make notes as to firearms position and firearm height as well as any functional problems.
- 7.2.5. On conclusion of the test firing, the FEU member will take photos or video of all markers, measurements and take notes of the location of the ejected cartridge cases.
- 7.2.6. Conclusions will be drawn based on the markers positioning of the ejected cartridge cases.

## 8. Sampling

- 8.1. Not applicable

## 9. Calculations

- 9.1. Not applicable

## 10. Uncertainty of Measurement

- 10.1. When quantitative results are obtained, and the significance of the value may impact the report, the uncertainty of measurement must be determined. The method used to determine the estimation of uncertainty can be found in the *FSL Quality Assurance Manual – Estimation of Uncertainty of Measurement (Section 5.4.6)* and in the **FEU Appendix A, Uncertainty of Measurement Guidelines**.

## 11. Limitations

- 11.1. Several factors and conditions to consider may include, but are not limited to, intervening objects, type of surface, weather, grade etc. These factors may affect the ultimate location of fired cartridge cases/shotshell casings at a shooting scene.
- 11.2. It should be noted that even when limitations are accounted for significant variability's may occur in the landing locations of spent cartridge casings.

## 12. Documentation

- 12.1. Miscellaneous Worksheet
- 12.2. Case Review Sheet
- 12.3. Photographs

12.4. FEU Report of Results

## 13. References

- 13.1. Haag, Lucien C., Shooting Incident Reconstruction, Academic Press, Burlington, MA (2006)
- 13.2. Garrison, D. H., "Reconstruction drive-By Shootings from Ejected Cartridge Case Location." AFTE Journal, 1993; 25(1):15.
- 13.3. Lewinski, W. J., Hudson, W. B., Karworski D., Redmann C. J., "Fired Cartridge Case Ejection Patterns from Semi-Automatic Firearms." Investigative Sciences Journal, November 2010, Volume 2, Number 3
- 13.4. *DFS Health and Safety Manual* (Current Version)
- 13.5. *Forensic Science Laboratory Quality Assurance Manual* (Current Version)
- 13.6. *FSL Departmental Operations Manuals* (Current Versions)
- 13.7. *FSL Laboratory Operations Manuals* (Current Versions)
- 13.8. *FEU01 - SOP for Safe Handling of Firearms* (Current Version)